Description

Charging cradle, power supply component for providing said charging cradle with power, connector for said power supply component for connection of said charging cradle and charging system constituted of aforementioned components.

The invention relates to a charging cradle for mobile communication terminals, a power supply component for supply of power to said charging cradle, a connector for said power supply component for connection to said charging cradle and a charging system for charging mobile communication terminals.

Systems for charging mobile communication terminals are generally known. Such systems consist of a charging cradle and a power supply component, which is connected electromechanically via a flexible electrical lead either directly or with a detachable connector to the charging cradle. Charging cradles for charging mobile communication terminals are thus known per se in this context. Furthermore power supply components for operating said charging cradles are known per se in this context. Also known per se in this context are direct connections and also detachable connections between the charging cradle and the power supply component.

The disadvantage here is that manufacturing of said parts and of the charging systems formed from these parts is still too expensive. Increased effort is also required to adapt the parts used in the charging system to any constructional changes made in the mobile terminal.

The object of the present invention is to specify a charging system for charging mobile communication terminals, a charging cradle and for operating the charging cradle a power supply component for use in said charging system in each case, as well

as a connector for detachable connection between said charging cradle and said power supply component which makes to manufacture the relevant parts individually and all together and thereby the charging system at lower cost as well as to implement a simplified method of adaptation to constructive changes made to assigned mobile communication terminals, while simultaneously retaining simple handling for installation of the parts and furthermore of the charging system.

As regards the charging cradle, this object is achieved in accordance with the invention by a charging cradle which has the features of claim 1. As regards the power supply component for supplying power to such a charging cradle, this object is achieved by a power supply component which has the features of claim 3. As regards the connector, this object is achieved by a connector which has the features of claim 5. As regards the charging system, this object is achieved by a charging system which has the features of claim 9.

The inventive charging cradle merely comprises a housing in which contact springs are arranged. The housing is assembled by simply snapping together two shaped sections. The contact springs are placed in one of the sections before the sections are snapped together.

For electrical connection of the charging cradle one of the shaped sections features an insertion shaft into which a connector can be introduced and positioned.

The connector is the electrical connection element via which the charging cradle is supplied with power. This is done by large-surface contact areas of the connector making contact on introduction of the connector into the insertion shaft of the one shaped section of the housing with spring tongues at the one end of the contact springs. At the other end of the contact

springs there are contact points provided, with which mating points on a mobile communication terminal which has been placed in the charging cradle for the purpose of charging it can make contact through openings in the housing.

The fact that the charging cradle consists of these few simple components and has no permanent electrical power connection, means that it can be manufactured and assembled at low cost using simple methods. In addition it can be easily set up initially without a cable and subsequently connected with an electrical connecting cable. Electrical connection with the electrical connecting cable can be undertaken just as easily since the connecting cable without the charging cradle permanently connected to it is small and light, so that it can be routed without any problems behind cabinets and through small openings.

Adapting the charging cradle to constructional changes in the mobile terminal assigned to the charging cradle, especially as regards the spacing of the mating contacts of the mobile communication terminal from each other can be undertaken in a simple manner by arranging the contact springs of the charging cradle correspondingly wide apart. This presents no problems since no account need be taken of complex components within the charging cradle. Such complex components, or for that matter any other components, are not present in the charging cradle. Only a new shaped section for the half of the charging cradle concerned is required, with the insertion shaft for the connector able to remain unchanged, since the change to the spacing of the contact points of the contact springs, thereby the spacing change of the contact springs and thereby the spacing change of the contact tongues for contacting the contact surfaces of the connector can be allowed for by the large surface of the contact areas of the connector without

changing the connector.

As regards the inventive power supply component for supplying power to such a charging cradle, this object is achieved by a power supply component which has grouped together in a single housing all the electronics and the control for this electronics for the purposes of charging a mobile communication terminal and is connected via a connecting cable with a connector with large-surface contact areas for contacting a charging cradle.

Such a power supply component is hardly any more expensive than a power supply component which does not also simultaneously contain the complete electronics and the entire control for charging a mobile communication terminal, because this electronics and this control can just be integrated into the electronics for the current and voltage transformation, which is present in any event in the power supply component. Few if any additional assembly steps are thus necessary to integrate this electronics and this control into the power supply component. The material costs too only increase slightly since the electronic components needed to make these changes can be placed at the same time on the existing base plate for the existing electronics.

On the other hand assembly steps and more costs are saved in manufacturing a charging cradle, for which the power supply component is intended since no circuit board with electronics for charging and control of the charging of a mobile communication terminal has to be provided there. Furthermore a large-surface connector connected to the power supply component has the advantage of being not significantly more expensive if any more expensive at all than a conventional connector. It does however have the particular advantage of being able to be provided with large-surface contact areas, which in their turn

have the advantage of being able, without being modified in any way themselves, of allowing for changes with regard to the spacing of the contact springs of a charging cradle. Even if this makes the power supply component a little more expensive overall, significantly greater costs can still be saved with this power supply component in relation to an associated charging cradle. In the final analysis greater cost savings can also be made in relation to the power supply component, since the large-area contact surfaces of the power supply component connector make it significantly more universal in its uses.

The inventive connector comprises a large-surface base unit, on the surface of which large-surface contact areas are provided for making contact with a charging cradle. Extending the surface of the contact areas on the surface of the connector for making contact with a charging cradle means that the precise spacing the contact springs of the charging cradle which contact the contact surfaces of the connector is not so important as far as the charging cradle is concerned. This can thus also be varied without the connector having to be modified.

The inventive charging system for charging mobile communication terminals consists of a charging cradle as described above, a power supply component as described above and a connector as described above. The advantages of such a charging system stem from the advantages of the individual components, which are able to be found in the description of the individual components.

Advantageous embodiments of the invention are the subject of the subclaims.

Accordingly position holders are formed into at least one of the shaped parts of the housing of the charging cradle, which

help to position and to fix the contact springs which are to be fitted into the charging cradle during their assembly and also afterwards.

Furthermore the housing of the power supply component is connected directly to an ac power plug. This means that the power supply component can simultaneously assume a further function, namely that of an ac power adapter. At the same time this means that the power supply component is tidied away after use and is not lying around in the room on its own.

The flat design of the connector makes it unobtrusive. Starting bevels on its flat contact surfaces allow the contact springs such as would be present in the charging cradle previously mentioned to slide down onto their mating surfaces.

Guides on the surface of the connector, on opposite surface of the connector to the contact surfaces of the connector for example, help the connector to find its end position when it is being plugged in.

An inventive charging cradle, an inventive power supply component and an inventive connector, which together form an inventive charging system for charging mobile communication terminals, are explained in more detail below with reference to a drawing. The Figures show:

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| Figure 1 | an exploded view of an inventive charging cradle, |
| Figure 2 | a power supply component in accordance with the invention, |
| Figure 3A | a connector in accordance with the invention corresponding to Figure 2, in a three-dimensional view from above, |

Figure 3B — a connector in accordance with the invention corresponding to Figure 2, in a three-dimensional view from below,

Figure 3C — an exploded view of an inventive connector,

Figure 4A — a three-dimensional view of the base of a charging cradle as shown in Figure 1,

Figure 4B — a three-dimensional internal view of a shaped part forming the base plate of the charging cradle shown in Figure 1, and

Figures 5A to 5C — a sequence of movements for a process of inserting the connector shown in one of the Figures 3A to 3C into a charging cradle shown in Figure 1.

The charging cradle 1 as shown in Figure 1 comprises two shaped parts 2 and 3, of which shaped part 2 forms a base plate and shaped part 3 forms a cover plate. Together the shaped parts 2 and 3 form a housing of the charging cradle 1. Shaped parts 2 and 3 are embodied so that they are able to be simply snapped together to form a housing.

In accordance with the present exemplary embodiment, one of the features of shaped part 3 is position holders 4 for contact springs 5.

Before the two shaped parts 2 and 3 are connected to each other, the contact springs 5 are inserted into the position holders.

The contact springs 5 feature contact tongues 6 at their one end and contact points 7 at their other end.

Shaped part 2 features a guide shaft 8 into which a connector 9

(Figure 2) can be introduced and is able to be positioned.

The contact points 7 are able to be contacted through openings 10 of shaped part 3 by a mobile communication terminal to be charged which is placed in the charging cradle 1 by its corresponding contact points. The contact tongues 6 are gripped from below by a connector 9 introduced into the guide shaft 8 (Figure 2) and thereby contacted.

The power supply component 11 shown in Figure 2 comprises a power adapter and charging component as a complete electronics unit to which an ac power plug 13 is fitted directly.

The power supply component 11 features a connecting cable 14 to the end of which the connector 9 is attached.

The connector 9 is has large surfaces and in accordance with the present exemplary embodiment is a flat design. On its upper side it has large-surface contact areas 15. On its base side it has at least a single guide 16.

Figures 3A and 3B show views of the upper side and the base of the connector 9 respectively. The large-surface contact areas 15 can especially be seen in Figure 3A and the guides 16 in Figure 3B.

In accordance with Figure 3B the connector 9 features two guides 16 which are formed as concave guide channels.

Figure 3C shows the connector 9 with its individual components. In particular the diagram shows the connecting cable 14, an upper section 17, a base section 18 and the large-surface contact areas 15.

Figure 4A shows the shaped part 2 in two time situations in which the connector 9 is being introduced into the guide shaft 8.

Figure 4B again shows the time situations, but viewed looking into the shaped part 2.

Figures 5A to 5C show the connection process in 3 time situations (A, B, C). The diagrams in particular show shaped parts 2 and 3 as well as connector 9.

In the first of the three situations (Figure 5A) the connector 9 is inserted into the guide shaft 8 so that it is positioned at a point shortly before a locking latch 19.

In the second time situation (Figure 5B) this locking latch 19 is already slightly raised by the connector 9.

In the third time situation (Figure 5C) the connector 9 is engaged in the locking latch 19 and thereby retained.

By raising an edge 20 the locking latch 19 can be raised manually, so that the connector 9 can be released from the locking latch 19. In this way the connector 9 can be removed again from the guide shaft 8.

During the three time situations above the large-surface contact areas 15 are contacted by the contact springs 5 (not shown in greater detail in Figures 5A to 5C).